storm moved eastward the hail-forming area was moving southwestward along its front. The ratio of the two movements was such that the resultant was a southerly movement of the hail-forming area. This would give the appearance of a hailstorm moving in a straight southerly direction. Had either the thunderstorm moved eastward at a different speed or the hail-forming area moved southwestward along its front at a different rate, the path of the hailstorm would have not been straight north and south.

The fall of hail continued longer in the southern end of the area than in the northern. This may be explained by the gradual weakening and slower spreading of the hail-forming area, together with a slower eastward movement of the thunderstorm. As the thunderstorm weakened it moved slower, and consequently the hail-forming area was over a unit of area longer than it was earlier in its course, when the movement of the thunderstorm was more rapid.

The weather map on the morning of the 16th was relatively "flat." The pressure was quite uniformly between 30 and 30.2 inches over the entire country, except over New England, western Idaho, Arizona, and the southern California coast. The highest pressure was 30.2 inches at Moorhead, N. Dak. During the day a slight depression developed over Nebraska and at 7 p. m. a LOW of 30 inches was central over the State. Thunderstorms were general during the day over a strip about a hundred miles wide, extending across the entire length of the State. The amounts of precipitation were light in the western half of the State, averaging mostly less than a quarter of an inch. In the eastern half the rainfall was heavier, ranging from a quarter of an inch to the excessive downpour of 5.80 inches at Oakdale. Along the Missouri River, except in the northeast corner of the State, the rainfall was light, and in the extreme southeastern counties no rain fell.

THE R.34 DESTROYED IN A GALE.

News has been received with regret that the great British dirigible, the R. 34, which so successfully crossed the Atlantic in July, 1919, was destroyed on January 28 at its base station at Howden, England, while endeavoring to reach its hangar in a gale. Having gone out on a practice cruise with the R. 32 the previous day, intending to return the same afternoon, through some misfortune in landing, two propellors were broken and three of the five engines put out of commission. With a 34-mile wind blowing, the dirigible was forced in a practically helpless condition some distance out to sea, but was able eventually to make some headway toward its base by means of the two remaining engines. Upon arriving at Howden an attempt was made to place it in its hangar, but the efforts of several hundred men were not effective in restraining it against the increasing wind. This wind, making gusts and eddies about the hangar, caused the ship to pitch in such a manner that several of the gondolas were smashed and the internal girder structure weakened to the breaking point. With the collapse of the rigid framework and the consequent piercing of the gas bags, the airship was practically destroyed. While mooring masts are yet in the experimental stage, it appears that in tests recently made, large rigid airships have outridden storms of as great severity as this with no damage whatsoever and without the aid of a large ground party. It is unfortunate indeed that this famous and costly ship could not have had access to such a mooring mast. While it is apparent that the reasons underlying the destruction of this ship are mechanical and could probably have been overcome with adequate equipment, such as that mentioned above, yet it furnishes a noteworthy example of the effect of weather upon aircraft and the importance of neglecting no opportunity to take account of this factor.—*C. L. M.*

551.583

ARE THE SEASONS CHANGING?

By CLARENCE J. ROOT, Meteorologist.

[Weather Bureau Office, Springfield, Ill.]

It is probably the experience of every Weather Bureau official to hear remarks similar to this: "The seasons are changing. We do not have the cold weather we did when I was a boy." With the exception of a few months in 1795, continuous temperature records have been maintained at New Haven, Conn., since February, 1780. The data used in this discussion were taken from the records of various observers from 1778 to 1872 and from those of the Weather Bureau station at New Haven from 1873 to the present.[1] The writer has averaged the annual mean temperature values by decades, with the following results:

For the 10 years ending—	Mean temperature (F.), degrees and tenths.
1790	49.6
1800	50.0
1810	50.4
1820	47.5
1830	49.3
1840	47.8
1850	49.2
1860	48.9
1870	49.1
1880	49.7
1890	48.9
1900	49.7
1910	49.7
1920	50.5

It will be noted that the warmest three periods are those ending in 1800, 1810, and 1920, and that the coldest decade immediately follows the second warmest.

Considering the individual months and the individual years, it is found that the coldest January occurred as late as 1857. The coldest February occurred 8 years after the warmest one. The coldest March was as late as 1870 and again in 1885. The coldest April was in 1874, and many years after the warmest one. In May we find a number of years with the same lowest temperature—1812, 1815, 1870, and 1882. The highest figures in June are in 1779, 1790, 1803, and 1876. In July the lowest was in 1816, with the warmest as early as 1780 and as late as 1876. The coldest August occurred 61 years after the warmest. In September the coolest months are in the earlier years, but for October, November, and December the coldest year came after the warmest year in each case.

Thus it will be seen that in nine months of the year the coldest one of record occurred after the warmest one. These figures seem to indicate very clearly that since the time of the Revolutionary War, at least, there has been no permanent change in temperature.

[1] The earlier observations are published in the *Transactions of the Connecticut Academy of Sciences*, vol. 1; they are summarized and combined with the Weather Bureau records in the *Annual Meteorological Summary for 1920*, published by the Weather Bureau office at New Haven, Conn.